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10/523,036	01/06/2006	Emilio Palomares Gil	FRYHP0130US	8797

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EXAMINER	
PENNY, TABATHA L	

ART UNIT	PAPER NUMBER
1712	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/523,036	PALOMARES GIL ET AL.	
	Examiner	Art Unit	
	TABATHA PENNY	1712	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 March 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *75-125* is/are pending in the application.

4a) Of the above claim(s) *109-125* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *75-108* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 February 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/6/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election of Group 1 in the reply filed on 3/15/2010 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

2. After further consideration, Claims 100-108 have been included with the elected Group 1; therefore, Claims 75-108 are elected without traverse and fully examined herein.

3. Claims 109-125 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 3/15/2010.

Priority

4. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

5. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a

separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 75-79, 82-84, 87-88, 99-105, and 108 rejected under 35 U.S.C. 102(b) as being anticipated by ICHINOSE et al. (Ichinose et al., *Stepwise Adsorption of Metal Alkoxides on Hydrolyzed Surfaces: A Surface Sol-Gel Process,* Chemistry Letters, 1996, 831-832). (Claim 87 evidenced by KSV (KSV Instruments Ltd., *What is a Quartz Crystal Microbalance,* Pharma Suppliers and News website))

8. **Regarding applicants' Claim 75, 100-101, 103, and 105,** ICHINOSE et al. discloses a low temperature fabrication method for fabricating conformal metal oxide coatings on a substrate (abstract and Fig. 1a) the method comprising the steps of : coating a surface of a substrate with a titanium alkoxide, i.e. a non-hydrolyzed precursor solution of one or more moisture sensitive metal alkoxides (abstract and 831 1st col. last para.) in an organic solvent (Table 1 footnote a) at a temperature of less than 150°C (Table 1); and rinsing the precursor solution coated on the surface of the substrate in water to hydrolyze the precursor solution at the surface of the substrate and thereby

form a conformal metal oxide coating on the substrate (Fig. 1 and col. 2) at a temperature of less than 150°C (Table 1 and footnote b).

9. **Regarding applicants' Claim 76-77,** ICHINOSE et al. discloses the metal alkoxide is titanium butoxide or aluminum butoxide or zirconium propoxide or nobium butoxide or tetramethyl orthosilicate (abstract).

10. **Regarding applicants' Claim 78,** ICHINOSE et al. discloses the step of coating the surface of the substrate is performed at 20°C (Table 1), i.e. room temperature.

11. **Regarding applicants' Claim 79,** ICHINOSE et al. discloses the coating is by immersion, i.e. dipping the surface of the substrate, in metal alkoxide solution, i.e. in the precursor solution, for 3-10 minutes (col. 1 last para.-col. 2 ln. 1).

12. **Regarding applicants' Claim 82 and 102,** ICHINOSE et al. discloses the precursor solution has a concentration of less than 200 mM (Table 1).

13. **Regarding applicants' Claim 83 and 104,** ICHINOSE et al. discloses the step of rinsing the surface of the substrate is performed at 20°C (Table 1 and footnote b), i.e. room temperature.

14. **Regarding applicants' Claim 84,** ICHINOSE et al. discloses the step of rinsing is performed by immersion, i.e. dipping, in water.

15. **Regarding applicants' Claim 87-88,** ICHINOSE et al. discloses the surface is a gold-coated QCM resonator, i.e. a structured surface. Gold-coated QCM resonators are flat surfaces (KSV Figure); therefore, ICHINOSE et al. inherently discloses the surface is a flat surface.

16. **Regarding applicants' Claim 99 and 108,** ICHINOSE et al. discloses the thickness of the coating is 46 angstroms, i.e. 4.6 nm (pg. 832 2nd col. ln. 10).

17. Claims 75, 85, 88-91, 93-98, and 106 are rejected under 35 U.S.C. 102(b) as being anticipated by PALOMARES et al. (Palomares et al., *Slow charge recombination in dye-sensitized solar cells (DSSC) using Al2O3 coated nanoporous TiO2 films,* Chem Communication, 2002, 1464-1465).

18. **Regarding applicants' claim 75,** PALMARES et al. discloses a low temperature method of fabricating a conformal Al2O3, i.e. metal oxide, coating on a substrate (abstract and pg. 1464 2nd col. 3rd para.) the method comprising the steps of: coating the surface of a substrate with aluminum butoxide, i.e. a non-hydrolyzed precursor solution of one or more moisture sensitive metal alkoxides, in isopropanol, i.e. in an organic solvent, at 60°C; and exposing to water vapor, i.e. rinsing the precursor solution coated on the surface of the substrate in water to hydrolyze the precursor solution at the surface of the substrate and thereby form a conformal metal oxide coating on the substrate, at 120°C (pg. 1464 2nd col. 3rd para.).

19. **Regarding applicants' claim 85 and 106,** PALMARES et al. discloses drying the surface of the substrate at 120°C (pg. 1464 2nd col. 3rd. para.).

20. **Regarding applicants' claim 88,** PALMARES et al. discloses surface is a fluorine doped conducting tin oxide glass with nanocrystalline TiO2 deposited thereon, i.e. a structured surface.

21. **Regarding applicants' claim 89,** PALMARES et al. discloses a porous film of nanocrystalline titanium dioxide, i.e. the structure is a nanoporous surface.

22. **Regarding applicants' claim 90,** PALMARES et al. discloses the surface is a nanocrystalline titanium dioxide, i.e. a reticulated surface.

23. **Regarding applicants' Claim 91,** PALOMARES et al. discloses the substrate is a fluorine doped conducting tin oxide glass with nanocrystalline TiO2 deposited thereon (pg. 1464 2nd col. 3rd para.). PALOMARES et al. does not appear to explicitly disclose the substrate includes a temperature sensitive-element; however, TiO2 sinters upon heating. Therefore, PALOMARES et al. inherently discloses the substrate includes a temperature sensitive element.

24. **Regarding applicants' Claim 93,** PALOMARES et al. discloses the molecules are TiO2, i.e. inorganic (pg. 1464 2nd col. 3rd para.).

25. **Regarding applicants' Claim 94,** PALOMARES et al. discloses the substrate is coated with the TiO2, i.e. the molecules are at the surface of the substrate (pg. 1464 2nd col. 3rd para.).

26. **Regarding applicants' Claims 95-96,** PALOMARES et al. does not appear to explicitly disclose the coating extends over regions of the surface of the substrate not encompassed by the molecules and encapsulates the molecules.

27. However, where the claimed and prior art products are identical or substantially identical in structure or composition, or a re produced by identical or substantially identical processes, a prima facie case of obviousness has been established. In re Best, 195 USPQ 430, 433 (CCPA 1977). When the structure recited in the prior art is

substantially identical to that of the claims, the claimed properties or function are presumed inherent. MPEP 2112. In this situation, the prior art exemplifies the applicants' claimed and disclosed method (see discussion with regards to Claim 75 and spec Example 2), so the claimed extension of the coating over regions of the surface of the substrate not encompassed by the molecules and encapsulation of the molecules by the coating are inherently present in the prior art. Absent an objective evidentiary showing to the contrary, the addition of the physical properties to the claim language fails to provide patentable distinction over the method of PALOMARES et al.

28. **Regarding applicants' claim 97,** PALMARES et al. discloses the substrate comprises a porous film of nanocrystalline TiO2, i.e. the substrate comprises particles.

29. **Regarding applicants' claim 98,** PALMARES et al. discloses the TiO2 is nanocrystalline, i.e. nanoparticles.

Claim Rejections - 35 USC § 103

30. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

31. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

32. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

33. Claim 80 is rejected under 35 U.S.C. 103(a) as being unpatentable over ICHINOSE et al. (Ichinose et al., *Stepwise Adsorption of Metal Alkoxides on Hydrolyzed Surfaces: A Surface Sol-Gel Process,* Chemistry Letters, 1996, 831-832) in view of BLOHOWIAK et al. (US 5,814,137).

34. **Regarding applicants' Claim 80,** ICHINOSE et al. discloses the step of coating is performed by immersion as discussed with regards to Claim 79. ICHINOSE et al. further discloses the coating solution is an aqueous sol (pg. 832 2nd col. last para.). ICHINOSE et al. does not appear to explicitly disclose the coating is performed by spraying.

35. However, BLOHOWAIK et al. discloses an aqueous sol can be applied to a substrate by dipping or spraying (abstract). The admission of BLOHOWAIK et al. that dipping and spraying are equivalent methods for applying an aqueous sol to the surface

of a substrate presents a strong case of prima facie obviousness for substituting one for the other.

36. At the time of the invention, it would have been *prima facie* obvious to one of ordinary skill in the art to substitute the dipping, of ICHINOSE et al. with spraying, as taught by BLOHOWAIK et al., because BLOHOWAIK et al. discloses they are both appropriate methods for applying an aqueous sol to the surface of a substrate.

37. Claim 81 is rejected under 35 U.S.C. 103(a) as being unpatentable over ICHINOSE et al. (Ichinose et al., *Stepwise Adsorption of Metal Alkoxides on Hydrolyzed Surfaces: A Surface Sol-Gel Process,* Chemistry Letters, 1996, 831-832) in view of ITSUKI et al. (US 2001/0050028).

38. **Regarding applicants' Claim 81,** ICHINOSE et al. discloses the step of coating is performed by immersion as discussed with regards to Claim 79. ICHINOSE et al. further discloses the coating solution is an aqueous sol (pg. 832 2nd col. last para.). ICHINOSE et al. does not appear to explicitly disclose the coating is performed by spin coating.

39. However, ITSUKI et al. discloses sol-gel processes for the production of oxides, in which metal alkoxide solutions are applied to substrates by spin coating methods are known ([0005]). One of ordinary skill in the art would have had a reasonable expectation of predictably obtaining the metal oxide coating, of ITSUKI et al., by using the spin-coating deposition method, as taught by ITSUKI et al., because ITSUKI et al.

discloses it is an appropriate method for depositing a metal alkoxide solution on the surface of a substrate.

40. At the time of the invention, it would have been *prima facie* obvious to one of ordinary skill in the art to use the spin-coating, of ITSUKI et al., instead of the dipping in the method, of ICHINOSE et al., because ITSUKI et al. discloses spin coating is an appropriate method for depositing metal alkoxide solutions on the surface of a substrate.

41. Claims 86 and 107 are rejected under 35 U.S.C. 103(a) as being unpatentable over PALOMARES et al. (Palomares et al., *Slow charge recombination in dye-sensitized solar cells (DSSC) using Al2O3 coated nanoporous TiO2 films,* Chem Communication, 2002, 1464-1465) in view of ICHINOSE et al. (Ichinose et al., *Stepwise Adsorption of Metal Alkoxides on Hydrolyzed Surfaces: A Surface Sol-Gel Process,* Chemistry Letters, 1996, 831-832).

42. **Regarding applicants' claim 86 and 107,** PALMARES et al. discloses drying the coating as discussed with regards to Claims 85 and 106. PALMARES et al. is silent as to the method used for drying the coating; therefore, one of ordinary skill in the art would have been motivated to look to the related art to determine an appropriate method for drying a hydrolyzed aluminum butoxide coating.

43. ICHINOSE et al. discloses drying a hydrolyzed aluminum butoxide coating with nitrogen gas (pg. 831 2nd col.); i.e. directing a gas flow there over. One of ordinary skill in the art would have had a reasonable expectation of predictably obtaining the dried

Al2O3 film with nitrogen gas of, ICHINOSE et al., as the drying method, of PALMARES et al., because ICHINOSE et al. discloses it is an appropriate method for drying a hydrolyzed aluminum butoxide coating.

44. At the time of the invention, it would have been *prima facie* obvious to one of ordinary skill in the art to modify the drying, of PALMARES et al., to include the nitrogen gas drying, of ICHINOSE et al., because ICHINOSE et al. discloses it is an appropriate method of drying a hydrolyzed aluminum butoxide coating.

45. Claims 92-94 are rejected under 35 U.S.C. 103(a) as being unpatentable over PALOMARES et al. (Palomares et al., *Slow charge recombination in dye-sensitized solar cells (DSSC) using Al2O3 coated nanoporous TiO2 films,* Chem Communication, 2002, 1464-1465) in view of SOMMELING et al. (Sommeling et al., *Flexible Dye-Sensitized Nanocrystalline TiO2 Solar Cells,* 2000, pg. 1-5).

46. **Regarding applicants' Claim 92,** PALOMARES et al. discloses a method as discussed with regards to Claim 91. PALOMARES et al. does not appear to explicitly disclose the substrate includes a temperature sensitive element which is selected from the group consisting of a plastic and a polymer.

47. However, SOMMELING et al. discloses a polymer foil can be used for the substrate instead of glass in dye-sensitized solar cells (3.2). SOMMELING et al. further discloses the polymer foil is sensitive to temperatures and is coated by room temperature sputtering with indium tin oxide (3.2.1). The admission of SOMMELING et al. that temperature sensitive polymer foils are equivalents to glass as the tin oxide

coated substrate of a dye-sensitized solar cell presents a strong case of prima facie obviousness for substituting one for the other in the method of PALOMARES et al.

48. At the time of the invention, it would have been *prima facie* obvious to on of ordinary skill in the art to use the temperature-sensitive polymer foil, of SOMMELING et al., instead of the glass substrate in the method of PALOMARES et al., because SOMMELING et al. discloses it is an equivalent substrate for use in dye sensitized solar cells.

Conclusion

49. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Tennakone et al. (Tennakone et al., *Dye-sensitized composite semiconductor nanostructures,* Physica E, 2002, 190-196) and Wakayama et al. (US 6,194,650) cited as evidence to the inherency of the limitations in Claims 95-96.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TABATHA PENNY whose telephone number is (571)270-5512. The examiner can normally be reached on Monday thru Friday 8:00am-4:30pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on (571)272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/tp/

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